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QUESTION BANK
WITH ANSWER KEY
& STRUCTURED EXPLANATION

CLASS 12
BIOLOGY

B+

A+

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7.MOLECULAR BASIS OF INHERITANCE

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

1. Match the codons with their respective amino acids and choose the correct answer.

Column-I	Column- II
(A) UUU	(1) Serine
(B) GGG	(2) Methionine
(C) UCU	(3) Phenylalanine
(D) CCC	(4) Glycine
(E) AUG	(5) Proline

CODES :

	A	B	C	D	E
a)	3	4	1	5	2
b)	3	1	4	5	2
c)	3	4	5	1	2
d)	2	4	1	5	2
e)	2	4	1	3	2

2. Match the following columns

Column-I	Column- II
(A) RNA digesting enzymes	(1) Lipase
(B) Protein digesting enzymes	(2) DNase
(C) DNA digesting enzymes	(3) Protease
(D) Fat digesting enzymes	(4) RNase

CODES :

	A	B	C	D
a)	3	4	2	1
b)	1	2	4	3
c)	4	3	2	1

d)   1   2   3   4

3. Match the following columns

	Column-I		Column- II
(A)	Segment of DNA coding for polypeptide	(1)	Recon
(B)	Segment of DNA goes for recombination	(2)	Muton
(C)	Segment of DNA goes for mutation	(3)	Cistron

CODES :

	A	B	C	D
a)	1	2	3	
b)	3	2	1	
c)	3	1	2	
d)	1	3	2	

4. Match the following columns

	Column-I		Column- II
(A)	Splicing	(1)	*Lac* operon
(B)	Okazaki fragment	(2)	Lagging strand
(C)	Jacob and Monod	(3)	Lactose
(D)	Inducer	(4)	Removal of introns

CODES :

	A	B	C	D
a)	1	2	3	4
b)	4	2	1	3
c)	4	2	3	1
d)	2	4	3	1

5. Identify the correct match between the codons and coding functions.

	Column-I		Column- II
(A)	AUG	(1)	Phenylalanine
(B)	UAA	(2)	Methionine
(C)	UUU	(3)	Tryptophan
(D)	UGG	(4)	Termination

CODES :

	A	B	C	D
a)	1	4	2	3
b)	2	4	1	3
c)	4	3	2	1
d)	4	1	3	2

6. Match the components of '*Lac*Operon' of *E.coli* given under column I with their function listed in column II. Choose the answer with correct combination of alphabets of the two columns.

Column-I	Column- II
(A) Structural gene	(1) Binding site for repressor protein
(B) Operator gene	(2) Codes for repressor protein
(C) Promoter gene	(3) Induces lactose transport from the medium
(D) Regulator gene	(4) Codes for enzyme proteins
	(5) Binding site for RNA polymerase

CODES :

	A	B	C	D
a)	2	5	1	3
b)	3	4	5	1
c)	4	1	5	2
d)	5	4	2	1

7. Match the following columns

Column-I	Column- II
(A) 5' AUG 3'	(1) Segment of DNA
(B) RNA with introns and exon	(2) Chromatin
(C) Gene	(3) *hn*RNA
(D) Nucleosomes	(4) Initiation codon

CODES :

	A	B	C	D
a)	4	3	1	2
b)	4	2	1	3
c)	2	1	4	3

d)   2   3   1   4

8. Match the following columns

	Column-I		Column- II
(A)	Termination (Translation)	(1)	Aminoacyl *t*RNA synthesis
(B)	Translation	(2)	Okazaki fragments
(C)	Transcription	(3)	GTP dependent release factor
(D)	DNA replication	(4)	RNA polymerase

CODES :

	A	B	C	D
a)	3	1	4	2
b)	2	3	1	4
c)	4	3	1	2
d)	2	1	3	4

9. Match the following columns and choose the correct option.

	Column-I		Column- II
(A)	*t*RNA	(1)	Linking of amino acids
(B)	*m*RNA	(2)	Transferof genetic information
(C)	*r*RNA	(3)	Nucleolarorganising region
(D)	Peptidyl transferase	(4)	Transfer of amino acid from cytoplasm to ribosome

CODES :

	A	B	C	D
a)	4	2	3	1
b)	1	4	3	2
c)	1	2	3	4
d)	1	3	2	4

10. Match the following columns

	Column-I		Column- II
(A)	z-gene	(1)	Transacetylase
(B)	y-gene	(2)	Permease
(C)	a-gene	(3)	B-galactosides

CODES :

	A	B	C	D
a)	1	2	3	
b)	3	2	1	
c)	1	3	2	
d)	3	1	2	

11. Match the following columns

Column-I		Column- II	
(A)	F. Miescher	(1)	DNA double helix
(B)	Griffith	(2)	Nuclein
(C)	Hershey and Chase	(3)	*Streptococcus pneumoniae*
(D)	Watson and Crick	(4)	Bacteriophage
(E)	Wilkins and Franklin	(5)	X-ray diffraction studies

CODES :

	A	B	C	D	E
a)	5	4	3	1	2
b)	1	4	3	2	2
c)	2	3	4	1	2
d)	1	3	4	2	2

12. Match the following columns

Column-I		Column- II	
(A)	Southern Blotting	(1)	Protein
(B)	Northern Blotting	(2)	DNA
(C)	Western Blotting	(3)	RNA

CODES :

	A	B	C	D
a)	3	1	2	
b)	3	2	1	
c)	1	2	3	
d)	1	3	2	

13. Match the following columns

Column-I	Column- II
(A) Topoisomerase	(1) Relaxes the DNA from its super-coiled nature
(B) DNA gyrase	(2) Relieves strain of unwinding by DNA helicase; this is a specific type of topoisomerase
(C) DNA ligase	(3) Re-anneals the semiconservative strands and joins Okazaki fragments of the lagging strand
(D) Primase	(4) Provides a starting point of RNA (or DNA) for DNA polymerase to begin synthesis of the new DNA strand
(E) Telomerase	(5) Lengthens telomeric DNA by adding repetitive nucleotide sequence to the ends of eukaryotic chromosomes

CODES :

	A	B	C	D	E
a)	1	2	5	4	3
b)	1	2	3	5	3
c)	5	4	3	2	3
d)	1	2	3	4	3

14. Match the following columns

Column-I	Column- II
(A) Sigma factor	(1) 5'-3'
(B) Capping	(2) Initiation
(C) Tailing	(3) 5' end
(D) Coding strand	(4) 3' end

CODES :

	A	B	C	D
a)	2	4	5	1
b)	1	2	3	4
c)	4	3	1	2
d)	5	3	2	1

15. Match the given enzymes with their respective function in DNA replication

Column-I	Column- II
(A) DNA helicase	(1) A protein which prevents DNA polymerase-III form dissociating from the DNA parent strand

(B)	DNA polymerase	(2)	Bind to ssDNA and prevent the DNA double helix from re-annealing after DNA helicase unwinds it thus maintaining the strand separation
(C)	DNA clam	(3)	Also known as helix destabilizing enzyme. Unwinds the DNA double helix at the replication fork
(D)	Single-Strand Binding (SSB) Proteins	(4)	Builds a new duplex DNA strands by adding nucleotides in the 5' to 3' direction. Also performs proofreading and error correction

CODES :

	A	B	C	D
a)	1	2	4	3
b)	3	4	1	2
c)	4	3	2	1
d)	1	2	3	4

16. Some of the inhibitors of bacterial protein synthesis and their effect are listed in Column I and Column II below. Match them and choose the correct option from answer key.

Column-I		Column- II	
(A)	Chloramphenicol	(1)	Inhibits binding of aminoacyl tRNA to ribosome
(B)	Erythromycin	(2)	Inhibits interaction between tRNA and mRNA
(C)	Neomycin	(3)	Inhibits initation of translation
(D)	Streptomycin	(4)	Inhibits peptidyltransferase activity
(E)	Tetracycline	(5)	Inhibits translocation of mRNA along ribosomes

CODES :

	A	B	C	D	E
a)	1	2	3	5	4
b)	3	1	5	4	4
c)	2	3	4	1	4
d)	4	5	4	3	4
e)	5	4	1	2	4

17. The diaram represents the 'central dogma' of molecular biology. Choose the correct combination of labeling.
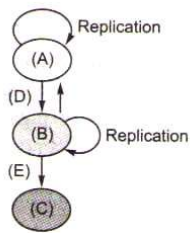
Column-I   Column- II

CODES :

	A	B	C	D	E
a)	protein	rna	dna	translatio	transcript
b)	rna	dna	protein	transcript	transcript
c)	transcript	translatio	translatio	dna	transcript
d)	dna	rna	protein	translatio	transcript
e)	dna	rna	protein	transcript	transcript

18. Match the following columns

Column-I   Column- II

(A) AUG   (1) Jacob and Monod

(B) UAA   (2) Transposons

(C) Operon model   (3) Chain terminating codon

(D) Jumping gene   (4) Methionine

CODES :

	A	B	C	D
a)	1	2	3	4
b)	4	1	3	2
c)	4	3	1	2
d)	2	3	1	4

19. Match the following columns

Column-I   Column- II

(A) Exon   (1) Coding sequence

(B) Intron   (2) Non-coding sequence

(C) Genetic code   (3) Triplet bases on mRNA

(D) DNA packaging   (4) Nucleosome

CODES :

	A	B	C	D
a)	1	3	2	4
b)	1	4	2	3
c)	1	2	3	4
d)	4	1	2	3

20. Match the enzyme in column I with its function in column II and choose the correct option.

Column-I	Column- II
(A) β-galactosidase	(1) Joining of DNA fragments
(B) Permease	(2) Peptide bond formation
(C) Ligase	(3) Hydrolysis of lactose
(D) Ribozyme	(4) Increases permeability to β-galactosidase

CODES :

	A	B	C	D
a)	2	1	4	3
b)	3	2	1	4
c)	2	4	1	3
d)	1	2	4	3

1. **(a)**
   UUU— Phenylalanine

   GGG—Glycine

   UCU—Serine

   CCC—Proline

   AUG—Methionine

2. **(c)**
   A. RNA digesting enzymes – RNase
   B. Protein digesting enzymes – Protease
   C. DNA digesting enzymes – DNase
   D. Fat digesting enzymes – Lipase

3. **(c)**
   Cistron, recon, muton term given by the Benzer to describe the gene
   Cistron Segment of DNA codes for polypeptide
   Recon Segment of DNA goes for recombination
   Muton Segment of DNA goes for mutation

4. **(b)**
   Splicing – Removal of introns
   Okazaki fragment – Lagging strand
   Jacob and Monod – *Lac* operon
   Inducer – Lactose

5. **(c)**
   AUG—Methionine

   UAA—Termination

   UUU—Phenylalanine

   UGG—Tryptophan

6. **(c)**

Column I	Column II
Structural gene	Codes for enzyme proteins
Operator gene	Binding site for repressor protein
Promoter gene	Binding site for RNA polymerase
Regulator gene	Codes for repressor protein

7. **(a)**
   5' AUG 3'   Initiation codon
   RNA with intron and exon   *hn*RNA
   Gene   Chromatin
   Nucleosome   Segment of DNA

8. **(a)**
   Termination – GTP release factor (in translation)
   Translation – Amino acyl *t*RNA synthesis
   Transcription – RNA polymerase
   DNA replication – Okazaki fragments

9. **(a)**

Column I	Column II
*t*RNA	Transfer of amino acid from cytoplasm to ribosome
*m*RNA	Transfer of genetic information
*r*RNA	Nucleolar organising region
Peptidyltransferase	Linking of amino acids

10. **(b)**
    Structural (*Lac operon*) **genes** Secretion
    Z-genes   -β-galactosidase
    Y-gene   -   Permease
    A-gene   -   Transacetylase
    Lac operon consists of the following parts
    (i) **Structural Genes** They transcribes the *m*RNA for polypeptide synthesis. An operon has one or more structural genes. *Lac operon of E. coli has three structural genes*
    Z-gene Encodes β-galactosidase (for hydrolyzing lactose or galactose)
    Y-gene Encodes permease (for allowing the entry of lactose)
    A-gene Encodes transacetylase (for metabolizing the toxic thiogalactosides which also allowed entry by lactose)
    (ii) **Operator Gene** It is gene which directly controls the synthesis of *m*RNA over structural genes. It is switched off by the presence of a repressor
    (iii) **Promoter Gene** It functions as the recognition centre for RNA-polymerase, provided the operator gene is switched on. RNA polymerase binds at this site
    (iv) **Regulatory Gene** (*lac i*-gene) in *lac* operon, it is called *i*-gene as it produces inhibitor or repressor. The repressor binds to the operator

gene and stops the working of operon

(v) **Inducer** It is the substrate that prevents the repressor from binding to the operator, so that transcription can be started

11 **(c)**

F Miescher – Nuclein

Griffith – *Streptococcus pneumonia*

Hershey and Chase – Bacteriophage

Watson and Crick – DNA double helix

Wilkins and Franklin – X-ray diffraction studies

12 **(b)**

TechniqueUsed for

Southern blotting –   DNA

Northern blotting –   RNA

Western blotting –   Protein

13 **(d)**

A-1, B-2, C-3, D-4, E-5

14 **(a)**

Sigma factor – Initiation of transcription

Capping – 3' end of RNA

Tailing – 5' end of RNA

Coding strand – 5'-3' strand of DNA

15 **(d)**

Enzyme	Function in DNA Replication
DNA helicase	Also known as helix destabilising enzyme. Unwinds the DNA double helix at the replication fork
DNA polymerase	Builds a new duplex DNA strand by adding nucleotides in the 5' to 3' direction. Also performs proofreading and error correction
DNA clamp	A protein, which prevents DNA polymerase III from dissociating from the DNA parent strand
Single-strand Binding (SSB) proteins	Bind to ssDNA prevent the DNA double helix from re-annealing after DNA helicase unwinds it thus maintaining the strand separation
Topoisomera se	Relaxes the DNA from its super-coiled nature
DNA gyrase	Relieves strain of unwinding by DNA helicase; this is a specific type of topoisomerase
DNA ligase	Re-anneals the semiconservative stands and joins Okazaki fragments of the lagging strand
Primase	Provides a starting point of RNA (or DNA) for DNa polymerase to begin synthesis of the new DNA strand
Telomerase	Lengthens telomeric DNA by adding repetitive nucleotide sequences to the ends of eukaryotic chromosomes

16 **(d)**

Column I	Column II
Chloramphenicol	Inhibits peptidyltransfera se activity
Erythromycin	Inhibits translocation of *m*RNA along ribosomes
Neomycin	Inhibits peptidyltransfera se activity
Streptomycin	Inhibits initation of translation
Tetracycline	Inhibits binding of aminoacyl*t*RNA to ribosome

17 **(d)**

Central dogma is the flow of information from DNA to *m*RNA and then to protein. It was originally formulated by **Crick**.

Central dogma of modern biology is shown as:

$$\text{DAN} \xrightarrow{\text{Transcription}} \text{RNA} \xrightarrow{\text{Translation}} \text{Proteins}$$

18 **(c)**

A Transposable Element (TE) is a DNA sequence that can change its position within the genome, sometimes creating or reversing the mutations and altering the cell's genome size. Transposition often results in the duplication of the TE Barbara McClintock's discovery of these jumping genes earned her a Nobel Prize in 1983.

Transposable Elements (TEs) represents one of the several types of mobile genetic elements. TEs are assigned to one or two classes according to their mechanism of transposition, which can be described as either copy and paste (class I TEs) or cut and paste (class II TEs)

19 **(c)**

Exon coding (functional) part of DNA or RNA

Intron non-coding (non-function) part of DNA or RNA

Genetic codes Triplet bases or *m*RNA

DNA packaging Nucleosomal model

20 **(b)**

β-galactosidase (β-gal), coded by z-structural genes, is primarily responsible for the hydrolysis of the disaccharide, lactose into its monomeric units, galactose and glucose.

1)	a	2)	c	3)	c	4)	b
5)	c	6)	c	7)	a	8)	a
9)	a	10)	b	11)	c	12)	b
13)	d	14)	a	15)	d	16)	d
17)	d	18)	c	19)	c	20)	b
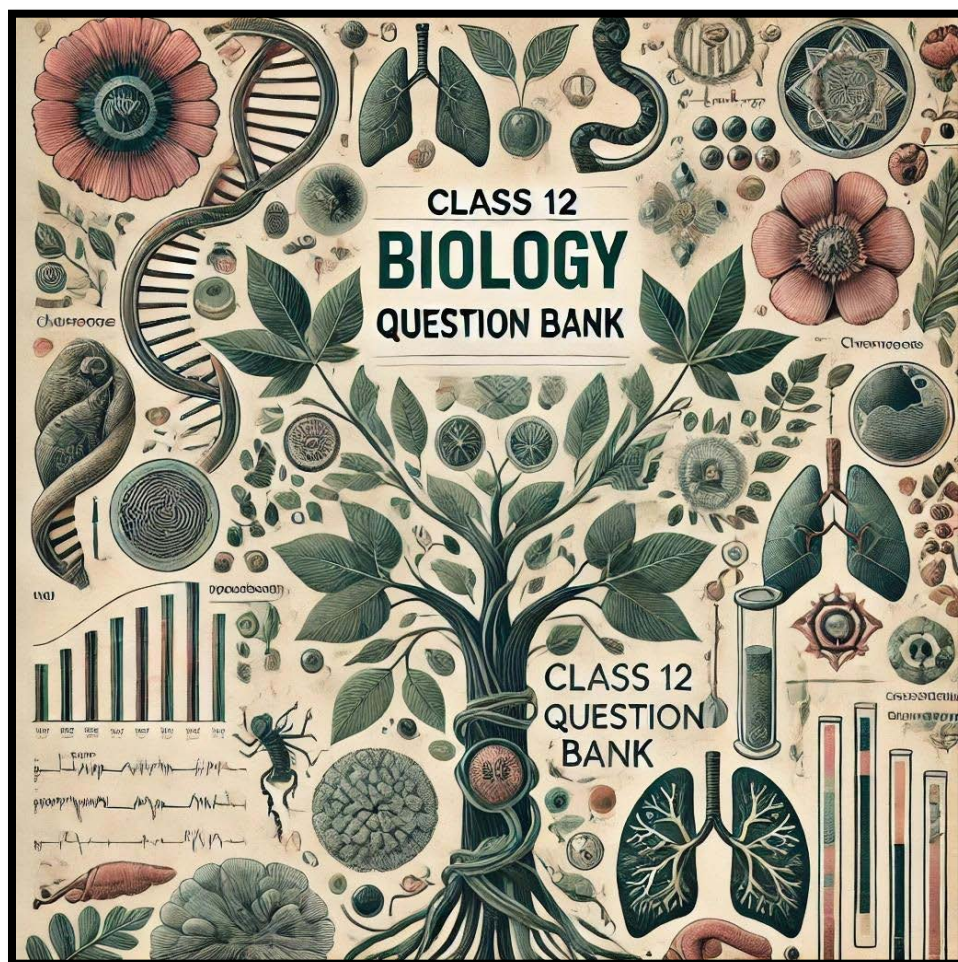
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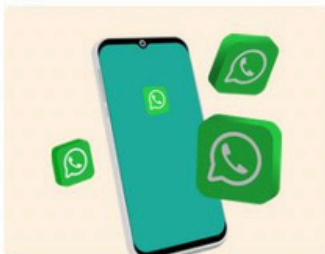
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SKILL MODULES BEING OFFERED IN MIDDLE SCHOOL

Artificial Intelligence

Beauty & Wellness

Design Thinking & Innovation

Financial Literacy

Handicrafts

Information Technology

Marketing/Commercial Application

Mass Media - Being Media Literate

Travel & Tourism

Coding
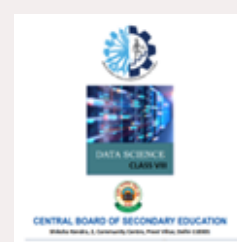
Data Science (Class VIII only)

Augmented Reality / Virtual Reality
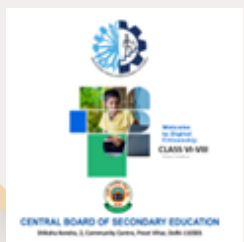
Digital Citizenship

Life Cycle of Medicine & Vaccine
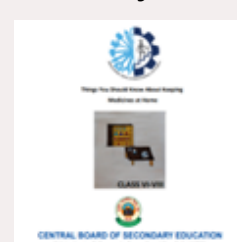
Things you should know about keeping Medicines at home

What to do when Doctor is not around
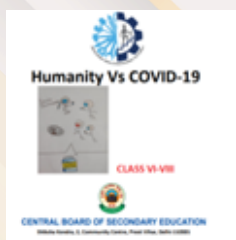
Humanity & Covid-19

Blue Pottery
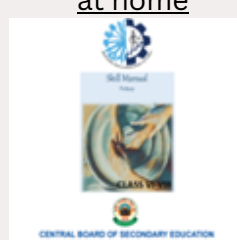
Pottery

Block Printing
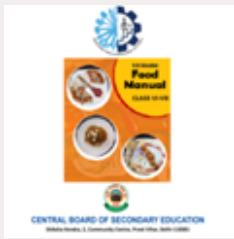
Food
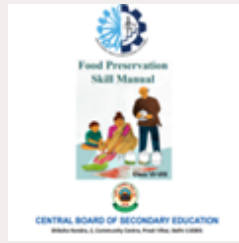
Food Preservation

Baking
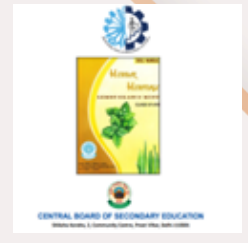
Herbal Heritage

Khadi
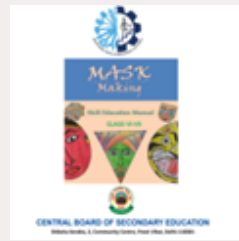
Mask Making

Mass Media
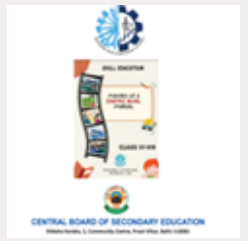
Making of a Graphic Novel
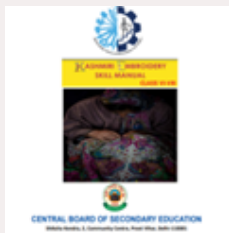
Kashmiri Embroidery

Embroidery

Rockets
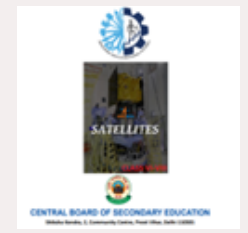
Satellites
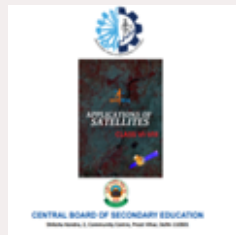
Application of Satellites

Photography

SKILL SUBJECTS AT SECONDARY LEVEL (CLASSES IX – X)

Retail
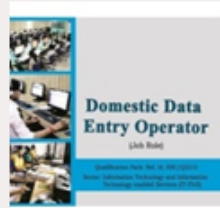
Information Technology

Security

Automotive

Introduction To Financial Markets
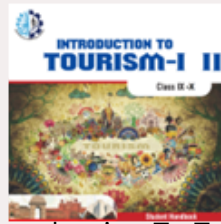
Introduction To Tourism
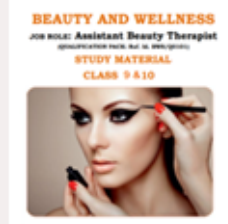
Beauty & Wellness

Agriculture

Food Production

Front Office Operations

Banking & Insurance

Marketing & Sales

Health Care

Apparel

Multi Media

Multi Skill Foundation Course

Artificial Intelligence

Physical Activity Trainer

Data Science

Electronics & Hardware (NEW)

Foundation Skills For Sciences (Pharmaceutical & Biotechnology)(NEW)

Design Thinking & Innovation (NEW)

SKILL SUBJECTS AT SR. SEC. LEVEL (CLASSES XI – XII)
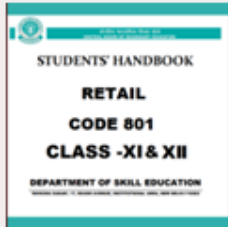
Retail
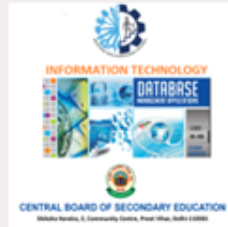
InformationTechnology

Web Application

Automotive

Financial Markets Management

Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

Banking

Marketing

Health Care

Insurance

Horticulture
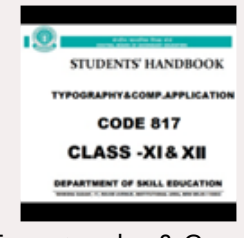
Typography & Comp. Application

Geospatial Technology
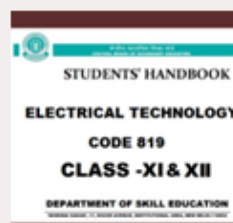
Electrical Technology

Electronic Technology
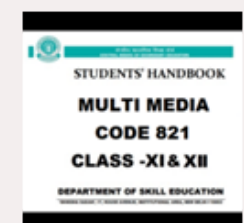
Multi-Media

Taxation	Cost Accounting	Office Procedures & Practices	Shorthand (English)
Shorthand (Hindi)	Air-Conditioning & Refrigeration	Medical Diagnostics	Textile Design
Design	Salesmanship	Business Administration	Food Nutrition & Dietetics
Mass Media Studies	Library & Information Science	Fashion Studies	Applied Mathematics
Yoga	Early Childhood Care & Education	Artificial Intelligence	Data Science
Physical Activity Trainer(new)	Land Transportation Associate (NEW)	Electronics & Hardware (NEW)	Design Thinking & Innovation (NEW)
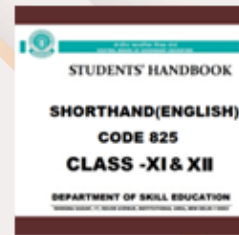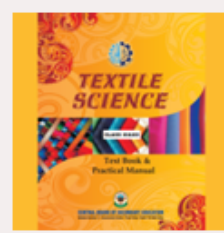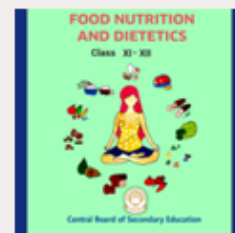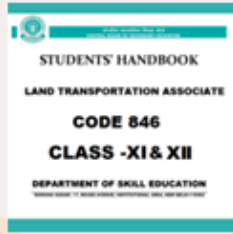
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Click Here to Join
Chemistry

Click Here to Join
English

Click Here to Join
Mathematics

Click Here to Join
Biology

Click Here to Join
Accountancy

Click Here to Join
Economics

Click Here to Join
BST

Click Here to Join
History

SOE	Click Here to Join		SOE	Click Here to Join		SOE	Click Here to Join
Geography			**Sociology**			**Hindi Elective**	
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Hindi Core			**Home Science**			**Sanskrit**	
SOE	Click Here to Join		SOE	Click Here to Join		SOE	Click Here to Join
Psychology			**Political Science**			**Painting**	
SOE	Click Here to Join		SOE	Click Here to Join		SOE	Click Here to Join
Vocal Music			**Comp. Science**			**IP**	
SOE	Click Here to Join		SOE	Click Here to Join		SOE	Click Here to Join
Physical Education			**APP. Mathematics**			**Legal Studies**	
SOE	Click Here to Join		SOE	Click Here to Join		SOE	Click Here to Join
Entrepreneurship			**French**			**IIT/NEET**	
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Artifical intelligence			**CUET**	

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Kindergarten

All classes

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Class 2

Class 3

Class 4

Class 5

Class 6

Class 7

Class 8

Class 9

Class 10

Class 11 (Sci)

Class 11 (Com)
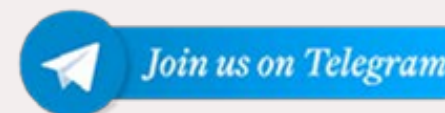
Class 11 (Hum)
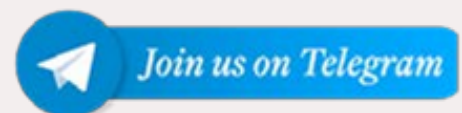
Class 12 (Sci)
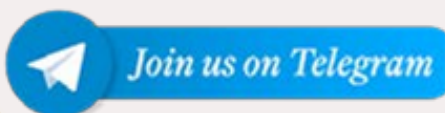
Class 12 (Com)
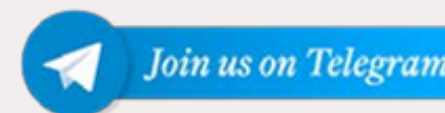
Class 12 (Hum)
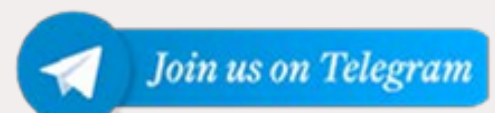
JEE/NEET
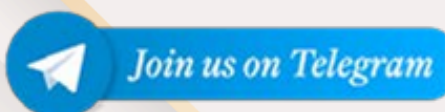
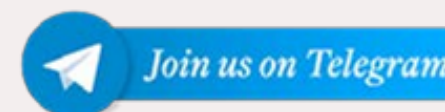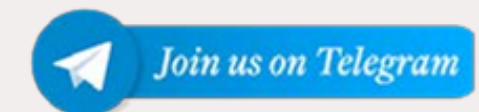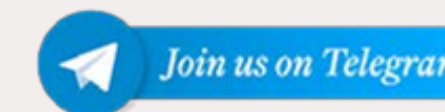**CUET**

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Principal Professional Group

Teachers Professional Group

Project File Group

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Join us on Telegram **Class 12 (Com)**	Join us on Telegram **Class 12 (Hum)**	